Complete Summary

GUIDELINE TITLE

Urinary tract infection—child.

BIBLIOGRAPHIC SOURCE(S)

Podberesky DJ, Unsell BJ, Gunderman R, Blatt ER, Coley BD, Fordham L, Prince JS, Feins N, Rodriguez W, Expert Panel on Pediatric Imaging. Urinary tract infection - child. [online publication]. Reston (VA): American College of Radiology (ACR); 2006. 7 p. [70 references]

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Gelfand MJ, Parker BR, Kushner DC, Babcock DS, Cohen HL, Hernandez RJ, McAlister WH, Royal SA, Slovis TL, Smith WL, Strain JD, Strife JL, Rushton HG. Urinary tract infection. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):847-54.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Urinary tract infection (UTI)

GUIDELINE CATEGORY

Diagnosis

CLINICAL SPECIALTY

Family Practice
Nephrology
Pediatrics
Radiology
Urology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of initial radiologic examinations in pediatric patients with urinary tract infection

TARGET POPULATION

Pediatric patients with urinary tract infection

INTERVENTIONS AND PRACTICES CONSIDERED

1. Invasive (INV), voiding cystourethrography (VCUG)
2. Nuclear medicine (NM)
    - Radionuclide cystography (RNC)
    - Renal cortical scintigraphy (RCS) plus pinhole imaging or single photon emission computed tomography (SPECT)
3. Ultrasound (US), kidneys and bladder, including power Doppler sonography
4. Computed tomography (CT), abdomen, with contrast
5. Magnetic resonance imaging (MRI), abdomen and pelvis, with contrast
6. X-ray, intravenous pyelography (IVP)

MAJOR OUTCOMES CONSIDERED

Utility of radiologic examinations in differential diagnosis

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

The total number of source documents identified as the result of the literature search is not known.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed for reaching agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a

consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Urinary Tract Infection -- Child

Variant 1: Age 0-2 years; maximum temperature <38.5 degrees C.

Radiologic Procedure	Appropriateness Rating	Comments
INV, VCUG (boys)	9	Accurate in evaluation of reflux. Better anatomic differentiation. Should be cycled.
NM, radionuclide cystography (RNC) (girls)	9	Accurate in evaluation of reflux. Lower radiation dose. Use in girls when no anatomic abnormality is suspected.
US, kidneys and bladder	9	Power Doppler sonography should be included.

Radiologic Procedure	Appropriateness Rating	Comments
INV, VCUG (girls)	8	Useful in girls when significant anatomic abnormality is suspected in addition to reflux. Should be cycled.
NM, renal cortical scintigraphy (RCS)	6	Small infants may present with pyelonephritis without fever. Consider pinhole and/or SPECT.
CT, abdomen, with contrast	4	Also an acceptable method of cortical imaging. Higher radiation dose.
MRI, abdomen and pelvis, with contrast	4	Also an acceptable method of cortical imaging. No ionizing radiation. Sedation required.
NM, radionuclide cystography (RNC) (boys)	2	Accurate in evaluation of reflux. Lower radiation dose. Poor anatomic differentiation.
X-ray, intravenous pyelography (IVP)	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Age 0-2 years; maximum temperature ≥38.5 degrees C.

Radiologic Procedure	Appropriateness Rating	Comments
INV, VCUG (boys)	9	Accurate in evaluation of reflux. Better anatomic differentiation. Should be cycled.
NM, radionuclide cystography (RNC) (girls)	9	Accurate in evaluation of reflux. Lower radiation dose. Use in girls when no anatomic abnormality is suspected.
US, kidneys and bladder	9	Power Doppler sonography should be included.
INV, VCUG (girls)	8	Useful in girls when significant anatomic abnormality is suspected in addition to reflux. Should be cycled.
NM, renal cortical	6	Small infants may present with

Radiologic Procedure	Appropriateness Rating	Comments
scintigraphy (RCS)		pyelonephritis without fever. Consider pinhole and/or SPECT.
CT, abdomen, with contrast	5	Also an acceptable method of cortical imaging. Higher radiation dose.
MRI, abdomen and pelvis, with contrast	5	Also an acceptable method of cortical imaging. No ionizing radiation. Sedation required.
NM, radionuclide cystography (RNC) (boys)	2	Accurate in evaluation of reflux. Lower radiation dose. Poor anatomic differentiation.
X-ray, intravenous pyelography (IVP)	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 3: Age 2-7 years; maximum temperature <38.5 degrees C.

Radiologic Procedure	Appropriateness Rating	Comments
US, kidneys and bladder	9	Power Doppler sonography should be included.
INV, VCUG (boys)	8	Accurate in evaluation of reflux. Better anatomic differentiation. Consider cycling.
NM, radionuclide cystography (RNC) (girls)	8	Accurate in evaluation of reflux. Lower radiation dose. Use in girls when no anatomic abnormality is suspected.
INV, VCUG (girls)	7	Useful in girls when significant anatomic abnormality is suspected in addition to reflux. Consider cycling.
CT, abdomen, with contrast	4	Also an acceptable method of cortical imaging. Higher radiation dose.
MRI, abdomen and pelvis, with contrast	4	Also an acceptable method of cortical imaging. No ionizing radiation. Sedation required.

Radiologic Procedure	Appropriateness Rating	Comments
NM, radionuclide cystography (RNC) (boys)	2	Accurate in evaluation of reflux. Lower radiation dose. Poor anatomic differentiation.
NM, renal cortical scintigraphy (RCS)	3	Consider pinhole and/or SPECT.
X-ray, intravenous pyelography (IVP)	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 4: Age 2-7 years; maximum temperature ≥38.5 degrees C.

Radiologic Procedure	Appropriateness Rating	Comments
INV, VCUG (boys)	9	Accurate in evaluation of reflux. Better anatomic differentiation. Consider cycling.
US, kidneys and bladder	9	Power Doppler sonography should be included.
NM, radionuclide cystography (RNC) (girls)	8	Accurate in evaluation of reflux. Lower radiation dose. Use in girls when no anatomic abnormality is suspected.
INV, VCUG (girls)	7	Useful in girls when significant anatomic abnormality is suspected in addition to reflux. Consider cycling.
NM, renal cortical scintigraphy (RCS)	6	Consider pinhole and/or SPECT.
CT, abdomen, with contrast	5	Also an acceptable method of cortical imaging. Higher radiation dose.
MRI, abdomen and pelvis, with contrast	5	Also an acceptable method of cortical imaging. No ionizing radiation. Sedation required.
NM, radionuclide cystography (RNC) (boys)	2	Accurate in evaluation of reflux. Lower radiation dose. Poor anatomic differentiation.

Radiologic Procedure	Appropriateness Rating	Comments
X-ray, intravenous pyelography (IVP)	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 5: Age 8+ years; maximum temperature <38.5 degrees C.

Radiologic Procedure	Appropriateness Rating	Comments
US, kidneys and bladder	8	Power Doppler sonography should be included.
INV, VCUG (boys)	5	
INV, VCUG (girls)	5	
NM, radionuclide cystography (RNC) (boys)	5	
NM, radionuclide cystography (RNC) (girls)	5	
CT, abdomen, with contrast	4	
MRI, abdomen and pelvis, with contrast	4	No ionizing radiation and sedation likely not required in this age group.
NM, renal cortical scintigraphy (RCS)	2	Consider pinhole and/or SPECT.
X-ray, intravenous pyelography (IVP)	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 6: Age 8+ years; maximum temperature ≥38.5 degrees C.

Radiologic Procedure	Appropriateness Rating	Comments
US, kidneys and bladder	8	Power Doppler sonography should be included.
INV, VCUG (boys)	5	
INV, VCUG (girls)	5	
NM, radionuclide cystography (RNC) (boys)	5	
NM, radionuclide cystography (RNC) (girls)	5	
NM, renal cortical scintigraphy (RCS)	4	Most appropriate if localizing symptoms not apparent. Consider pinhole and/or SPECT.
CT, abdomen, with contrast	4	
MRI, abdomen and pelvis, with contrast	4	No ionizing radiation and sedation likely not required in this age group.
X-ray, intravenous pyelography (IVP)	2	
Appropriateness Criteria Scale **1 2 3 4 5 6 7 8 9** **1 = Least appropriate 9 = Most appropriate**		

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Definition of Urinary Tract Infection

The urinary tract infection (UTI) should be well documented. Specimens from infants and young children collected in plastic bags are not acceptable because they are frequently contaminated; the use of bagged specimens leads to a child undergoing unnecessary imaging procedures.

Sequelae of Urinary Tract Infection

Cystitis in the absence of pyelonephritis is not associated with long-term sequelae. The incidence of scarring in children following infection of the renal

parenchyma varies widely in the literature, with a mean of about 40% to 45% of cases across a wide age range. Renal insufficiency is an uncommon sequela of pyelonephritis in childhood, except in cases where there has been substantial prenatal injury due to obstruction or vesicoureteral reflux, and in cases with bilateral renal scarring. Hypertension appears to be a more common sequelum of moderately severe or severe scarring, affecting 10%–25% of young adults with significant renal scarring in increasing frequency through their second, third, and fourth decades. At this time, there is no evidence that a few scattered small parenchymal scars predispose adolescents or young adults to hypertension, but there may be some risk of hypertension associated with medium-sized scars.

Risk of Pyelonephritis

Children with vesicoureteral reflux (VUR) are at increased risk for pyelonephritis and parenchymal scarring. Long-term low-dose antibiotic suppression is widely used after the acute infection in children with VUR. Until 1986, it was thought that pyelonephritis in children occurred only when VUR was present, but it has become clear that more than half the cases of acute pyelonephritis occur in the absence of VUR. The incidence of acute pyelonephritis in the absence of documented VUR is much too high to be explained by intermittent VUR. Pyelonephritis in these children appears to be due to the same pathogens as in children with documented VUR. Previous episodes of pyelonephritis and VUR each place the child at increased risk for future episodes of pyelonephritis. Accurate diagnosis of acute pyelonephritis may affect the length of stay in hospitalized patients and may also affect treatment after the acute infection – for example, the decision whether to place the child on antibiotic suppression.

Imaging Evaluation

Clinical Diagnosis of Acute Pyelonephritis

Approximately 50% to 90% of children hospitalized for acute pyelonephritis have evidence of acute pyelonephritis by the most accurate imaging examinations, and clinical signs and laboratory examinations are only moderately useful. The usual clinical definition of acute pyelonephritis (particularly in Europe) is fever of greater than 38.5°C, UTI adequately proven by culture, and elevated acute phase reactants (usually C-reactive protein [CRP] levels >10 mg/L). In most series, approximately 50%–80% of children who meet these criteria have evidence of acute pyelonephritis on cortical scintigraphy.

Voiding Cystography and VUR

VUR is detected with equal sensitivity by fluoroscopic contrast voiding cystourethrography (VCUG) and direct radionuclide cystography (RNC). Failure to detect reflux by either method is usually due to intermittent low-grade VUR; in other words, the patient has intermittent VUR but simply did not reflux at the time the bladder was filled and imaged. A second filling of the bladder (cyclic cystography) is appropriate in children under 2 years of age who cannot inhibit voiding, and when there is a high suspicion that VUR is present, as children in both of these groups are at higher risk of developing renal damage from urinary infection. Cyclic cystography may be appropriate in children over 2 years of age as well.

RNC has a much lower absorbed radiation dose than VCUG, but it does not have the spatial resolution needed to identify anatomic abnormalities of the urethra, bladder, and ureters. RNC is appropriate for follow-up of VUR and for screening asymptomatic siblings of children with VUR. Initial evaluation of VUR in girls may be done by RNC, unless there is reason to believe that a significant anatomic abnormality of the upper urinary tract is present (for example, from a prior ultrasound). The frequency of lower urinary tract findings other than VUR in girls with UTI is extremely low. Initial evaluation of VUR in boys should not be done exclusively by RNC, as adequate anatomic imaging of the urethra and bladder can only be done with VCUG.

Detection of Acute Pyelonephritis and Renal Parenchymal Scarring

Renal Cortical Scintigraphy (RCS)

RCS using technetium-99m DMSA or technetium-99m glucoheptonate is sensitive and specific for detecting acute pyelonephritis in animal studies, with sensitivity of about 90% and specificity of 95%. RCS is more sensitive than ultrasound (US) and intravenous pyelography (IVP) in detecting renal parenchymal scars. In the typical clinical setting, however, acute pyelonephritis and renal parenchymal scarring are usually but not always distinguishable from each other by RCS. Although RCS images are of somewhat higher quality when technetium-99m DMSA is used, technetium-99m glucoheptonate has equal sensitivity for detecting acute and chronic pyelonephritis and allows identification of most dilated uropathies (which is somewhat more difficult with DMSA) due to its approximately 40% to 65% renal excretion. However, in the presence of significant hydronephrosis or dilative VUR, it may be difficult to differentiate cortical activity from collecting system activity with technetium-99m-glucoheptonate, which makes DMSA a more desirable agent for renal cortical imaging in most cases. Technetium-99m DMSA is preferred in small infants, in poorly functioning kidneys, and when other studies have identified dilated uropathy or high-grade VUR. Pinhole imaging or single photon emission computed tomography (SPECT) should be considered to maximize the sensitivity of RCS without loss of specificity. RCS may require sedation in young children.

Ultrasonography (US)

Gray-scale ultrasonography identifies about 25% of acute pyelonephritis and about 40% of chronic parenchymal scarring. Acute pyelonephritic changes, particularly renal enlargement, cannot be identified on US 1 to 2 weeks after presentation, when the acute infection has cleared. US reliably identifies severe parenchymal scarring, but not moderate or minimal scarring. Inter- and intraobserver error makes assessment of renal growth unreliable after the first year of life unless the period of observation is at least 12 to 18 months. US cannot reliably identify VUR, but it is extremely effective in identifying urinary tract malformations such as hydronephrosis, hydroureter, and ureterocele. It is noninvasive and does not involve ionizing radiation. While animal studies have shown power Doppler imaging to be significantly less accurate in detecting acute pyelonephritis when compared with other imaging modalities, recent clinical studies in children have shown good results. A positive power Doppler US may be able to obviate the need for a renal cortical scan in the detection of acute pyelonephritis in children.

Contrast-Enhanced Computed Tomography and Magnetic Resonance Imaging

Helical contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI) after contrast administration are probably as sensitive as RCS in detecting acute pyelonephritis. Both CT and MRI provide more anatomic information about the collecting systems and ureters than is available from RCS, and both can provide information about renal scarring. CT has a considerably higher effective absorbed radiation dose than RCS. MRI is more expensive than CT, typically requires sedation in young children, and utilizes no ionizing radiation. MRI may be used to identify ectopic ureters and can provide renal functional data. Early studies indicate that post-gadolinium imaging may be most effective in identifying acute pyelonephritis, while T1-weighted sequences may be all that is necessary for identifying renal scarring.

Intravenous Pyelography (IVP)

IVP is insensitive when compared with other imaging modalities in the diagnosis of acute pyelonephritis or post-infectious scar. It is valuable in identifying detailed ureteral and calyceal anatomy, permitting characterization of duplication anomalies when this information is needed. Routine anatomic diagnosis is usually done by ultrasonography. IVP examinations in infants are often of poor quality.

Choice of Upper Urinary Tract Examination in Children

Acute pyelonephritis may occur in the absence of fever in an infant. If only a single upper urinary tract examination can be performed, the physician must compare the relative risk of failing to detect acute pyelonephritis when only power Doppler US is used to the risk of failing to detect dilated uropathy when only RCS is used. Appropriate sequencing of RCS and US also may be used to improve diagnostic yield and control imaging costs. Whenever it is important to identify both pyelonephritis and urinary tract dilatation (in an individual or a subpopulation), both RCS and US should be used, or alternatively, a single contrast-enhanced CT or MRI examination may be performed.

Age and the Choice of Examination

Findings on imaging studies vary considerably according to the age at which the child is imaged. It is well known that the incidence of VUR decreases with age. The prevalence of VUR in children with UTI drops from approximately 50% to 30% from 0 to about 2 years of age, plateaus at approximately 30% from about 2 to about 7 years of age, and then drops precipitously at about 7 years of age. Another factor that may support the use of age-specific algorithms is the higher incidence of acute pyelonephritis in young children with UTI when compared to infants with UTI. Infants and toddlers appear to be at greater risk for extensive renal injury from acute pyelonephritis than older children, and afebrile pyelonephritis is probably rare after the first year of life. In the school-age period, children between 5 and 8 years of age acquire the ability to identify acute pyelonephritis as flank pain. At the same time, the incidence of acute pyelonephritis is relatively low, and the incidence of VUR continues to decrease.

Abbreviations

- C, Celsius
- CT, computed tomography
- INV, invasive
- IVP, intravenous pyelography
- MRI, magnetic resonance imaging
- NM, nuclear medicine
- RCS, renal cortical scintigraphy
- RNC, radionuclide cystography
- SPECT, single photon emission computed tomography
- US, ultrasound
- VCUG, voiding cystourethrography

CLINICAL ALGORITHM(S)

Algorithms were not developed from criteria guidelines.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of pediatric patients with urinary tract infection

POTENTIAL HARMS

- Computed tomography (CT), radionuclide cystography (RNC), renal cortical scintigraphy (RCS), and voiding cystourethrography (VCUG) are associated with radiation.
- Magnetic resonance imaging (MRI) in small children (under 8 years of age) requires sedation.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other

imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Podberesky DJ, Unsell BJ, Gunderman R, Blatt ER, Coley BD, Fordham L, Prince JS, Feins N, Rodriguez W, Expert Panel on Pediatric Imaging. Urinary tract infection - child. [online publication]. Reston (VA): American College of Radiology (ACR); 2006. 7 p. [70 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999 (revised 2006)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Pediatric Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Daniel J. Podberesky, MD; Bryan J. Unsell, MD; Richard Gunderman, MD, PhD; Ellen R. Blatt, MD; Brian D. Coley, MD; Lynn Fordham, MD; Jeffrey Scott Prince, MD; Neil Feins, MD; William Rodriguez, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Gelfand MJ, Parker BR, Kushner DC, Babcock DS, Cohen HL, Hernandez RJ, McAlister WH, Royal SA, Slovis TL, Smith WL, Strain JD, Strife JL, Rushton HG. Urinary tract infection. American College of Radiology. ACR Appropriateness Criteria. Radiology 2000 Jun;215(Suppl):847-54.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

ACR Appropriateness Criteria® *Anytime*, *Anywhere*™ (PDA application). Available from the ACR Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

PATIENT RESOURCES

None available

NGC STATUS

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